UPDATE

PRINCE EDWARD ISLAND'S ENERGY STRATEGY

MARCH 1, 1981

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INTRODUCTION

The Energy Strategy for Prince Edward Island released in January, 1980, had as its general objective to reduce the dependence of this Province on imported oil. The methods suggested for achieving this objective were:

1. To reduce demand for energy through conservation and more efficient usage;

2. To develop local renewable energy sources such as wood, wind, solar and hydro.

A number of potential projects reflecting this methodology were identified and have provided the focus for energy related activities in the Province.

Two categories of projects were developed; one, where sufficient information was currently available upon which to develop a project, and a second where additional information and planning were required prior to defining the direction the project would take.

What follows, is an update of these projects, whether currently underway or proposed under the Canada/P.E.I. Conservation and Renewable Energy Demonstration Agreement.

FIRST CATEGORY

1. ENERGY FROM WASTE PROJECT - CHARLOTTETOWN

This project envisaged the utilization, on an annual basis, of some 26,000 tons of municipal refuse to generate steam to be utilized either for heating or generation of electricity. The initial site selected was adjacent to the Maritime Electric Company plant in Charlottetown, with all steam sales going to Maritime Electric. Unfortunately, due to the pollution loadings from existing facilities in the area, this project received adverse publicity and at the request of Executive Council the application for a building permit was withdrawn from City Hall.

The Corporation is currently investigating alternate locations for the project and will be reporting its findings back to Executive Council.

2. ONE MEGAWATT GASIFIER POWER PLANT - SUMMERSIDE

The P.E.I. Energy Corporation has been investigating the possibility of constructing a wood gasifier/engine/generation plant on the Island which would demonstrate the production of electric power using wood and wood residuals as the fuel source. The 1,000 KW demonstration plant will feed its electrical output into the Summerside distribution system and operate in parallel with the Maritime Electric transmission system.

The gasifier equipment which has been recommended is the Imbert Gasifier from West Germany. The Government of West Germany continues to have significant interest in the project to the extent that it is willing to participate financially in the construction and the research and development programs for the plant, in return for the opportunity to demonstrate the technology in North America. The financial arrangements between the province, the federal government and West Germany are currently being negotiated and it is

anticipated that the project will commence construction in 1981.

3. AUTO FUEL ECONOMY AND EMISSION TEST PROGRAM

A program of emission testing and carburetor adjustment to reduce the level of hydrocarbons and carbon-monoxide in the exhaust gases was held in Charlottetown during the week of July 14-19, 1980. The program was a cooperative effort of the Centre for Energy Studies of the Technical University of Nova Scotia; the Mobile Sources Division of the Air Pollution Control Directorate of Environment Canada; and the Prince Edward Island Energy Corporation. Five hundred and twenty vehicles were tested during the period.

The program was well received by the public (520 vehicles tested), and indicated that only 32% of the vehicle fleet was within specification when initially tested. A large percentage of these vehicles were satisfactorily adjusted.

Fuel economy data collected suggests that substantive low exhaust emissions; 61% of the vehicles experienced an improvement of fuel economy between 0 and 15%. These results clearly indicated that there is a need for this service to be available on a continuing basis in various locations throughout P.E.I.

A public meeting was held on February 16, 1981, to further discuss the results of the testing done last July. The general concensus was that:

- there is an inadequate supply of testing equipment available on the Island;

- a public education program was required;

- training seminars were required for mechanics using the equipment.

An auto fuel and economy test program to meet these needs is proposed under the Canada/P.E.I. Conservation and

Renewable Energy Demonstration Agreement.

4. CONVERSION OF PUBLIC BUILDINGS

The heating systems for the O'Leary Regional Services Centre, which also services the Veterinary Clinic, has been converted by Public Works from oil to wood pellets. The installation has been completed and is now operational.

As part of the conversion program for the old Court House building, Public Works proposes to install a wood pellet system. Contract documents are currently being prepared and the system will be on the line for the next heating year.

The Energy Corporation has received approval in principle from the Board of Directors of the Kings County Memorial Hospital to convert the Hospital to a wood chip burning system. The Kings County Memorial Hospital, which has a boiler rating of 100 H.P. and using over 100,000 gallons of #2 fuel per year, was selected as a demonstration project because of the high load factor relating to the hospital since it has its own laundry facilities. I believe contract documents are currently being prepared and the system will be in service by the fall of 1981.

The Department of Highways and Public Works has included in its 1981-82 budget funds for the conversion of three more public buildings.

5. ELECTRICAL SUPPLY AND DEMAND

The Board of Directors of the P.E.I. Energy Corporation has given approval to a study to consider the ordered development of the supply and demand for electricity on P.E.I. The main elements of the study will be the investigation of demand, examination of available supply resources, and the development of supply plans.

The terms of reference have been finalized and requests for proposals have gone out. It is anticipated that the contract to complete the study, estimated at $50,000, will be awarded early in April, 1981. The study is to be completed within a six-month time period.

6. RESIDENTIAL FURNACE DEMONSTRATION

As part of the Canada/P.E.I. Energy Agreement, a number of Island homes were selected for heating demonstrations. The project is being managed by the Institute of Man and Resources and the heating systems are designed to meet the full heating load of the various homes.

Sixty residential wood heating systems have been installed in Island homes using two types of equipment previously demonstrated. Thirty wood chip units have been placed in rural homes having the fuel produced from a woodlot under active forest management. Thirty wood pellet units have been installed in urban homes with the fuel supplied by tanker truck and delivered on a schedule. Local production of wood pellet fuel is also being encouraged. The equipment will provide all the space heat and hot water requirements of the homes in the project. This project has been planned to run for three years.

7. ETHANOL FROM CULL POTATOES

The Energy Corporation has entered into a formal agreement with St. Clair Duffy of Kinkora, to construct an ethanol plant at Kinkora and utilize cull potatoes as the raw material. In conjunction with the ethanol demonstration project, the Department of Agriculture will be conducting feed trials on the stillage generated and an automotive test program for utilization of the ethanol will be carried out.

Initially, the plant will be operated at 10,000 gallons per year, but the equipment design is such that the plant can produce 100,000 gallons of ethanol with a 90-95% alcohol content. The building will be completed by mid April, and equip-

ment is on order. It is anticipated that the plant will be operational by the end of July, 1981.

8. WOOD PELLET DEMONSTRATION

A consultant has been retained to prepare a complete description of a fully integrated fuel/feed pellet producing plant for P.E.I. and to assess the feasibility thereof. The proposed plant is anticipated to have a capacity of 100 tons/day.

9. CAR POOLING AND TRIP COMBINING

Two transportation-related projects have been included as proposals under the Canada/P.E.I. Conservation and Renewable Energy Demonstration Agreement to compliment the existing Enerpool System.

Traffic Energy Management

This is a posposal to develop, implement and evaluate a comprehensive traffic energy management program for Charlottetown. The intent of this project is to identify the supply of and demand for transportation services in Charlottetown and from this, develop and appropriate the traffic energy management program. The program would include a description of recommended measures, and their costs, and an implementation and evaluation time frame. In the second phase, the proposed program would be implemented.

Comprehensive Ride-Sharing

This proposal is designed to increase the energy efficiency of the urban transportation system and reduce the consumption of petroleum products by promoting ride-sharing. In the first phase of this project, the potential costs and benefits of a ride-sharing demonstration program will be examined and an implementation program developed. This would be followed by a demonstration phase where the ride-sharing services are implemented and operated.

10. RESIDENTIAL RETROFIT

Housing Conservation Retrofit

This is a proposed program under the P.E.I. Conservation and Renewable Energy Deomonstration Agreement designed to demonstrate to homeowners the tangible benefits that can be expected from conservation retrofit and to provide the technical basis for the safe and economic transformation of P.E.I.'s housing stock. A representative sample of Island housing stock would be thermally upgraded using methods which would maximize the retrofit investment and avoid undersirable side effects resulting from the retrofit.

SECOND CATEGORY

1. WIND ENERGY CONVERSION SYSTEM - MT. PLEASANT AIRPORT

The P.E.I. Energy Corporation, in conjunction with the Institute of Man and Resources and Maritime Electric Company, have prepared a submission to the federal government for the installation of a 1.5 Megawatt wind farm at Mt. Pleasant Airport. The installation would consist of six 250 KW units. The estimated capital cost of the project is $3 million, with the initial funding coming from federal sources.

Construction of an array of windmills as proposed is new technology and is being looked on with considerable interest by the National Research Council. Assuming that the necessary agreement is resolved by early summer, then the installation could be on the line for testing in the fall of 1982.

2. WOOD-FIRED ELECTRIC POWER PLANT

The Energy Corporation is currently investigating the feasibility of the installation of a 5 Megawatt wood-fired electric power plant in the province. As part of their investigation, the location for such a plant will be identified. The project will be evaluated not only from its capital cost, but the economic benefits that the province will incur, such as additional employment in the forestry industry and developing a market for utilization of waste wood. An economic analysis completed by the Planning and Statistics Division of the Department of Finance, indicated that a substantial annual subsidy by the province would be required for the project to be competitive with the present pricing arrangement with New Brunswick for power.

The decision has been made to hold this project in abeyance until completion of the Electrical Supply and Demand Study.

3. DISTRICT HEATING

The P.E.I. Energy Corporation has retained Shawinigan Engineering to develop a comprehensive district heating proposal for downtown Charlottetown. This proposal will be submitted to the Federal Department of Energy, Mines and Resources for project funding. The study by Shawinigan will be completed by mid April, 1981, and forwarded to Energy, Mines and Resources shortly thereafter.

4. WIDE AREA MONITORING (WAMO)

This project proposal under the Canada/P.E.I. Conservation and Renewable Energy Demonstration Agreement, is designed to demonstrate the ability of a microprocessor network, using dial-up communication links, to achieve and sustain maximum demand and energy savings in widely scattered buildings. The WAMO system will provide energy specialist attention to each building connected on a daily basis. In buildings using 25-KWH per squre foot per year of energy or more, at least 25 percent energy savings should be realized and sustained by this project.

5. FARM ENERGY SERVICE

Programs are currently being prepared or have been proposed under the Canada/P.E.I. Conservation and Renewable Energy Demonstration Agreement related to this topic. They include the following:

Energy Conservation on the Farm

The Provincial Department of Agriculture, in cooperation with the Energy Corporation and the Institute of Man and Resources, are developing a program for 1981 relating to energy conservation on the farm. The purpose of this program is to create an awareness of conservation practices and sources of energy that can assist in the development of the Island agriculture and to reduce cost in production of food and fibre. Existing Agriculture engineering programs will be reviewed and adjusted in light of the current high energy costs. The

proposed approach to be taken would be to select two farms for energy audit and modification to evaluate improvements which can be obtained. It is also proposed to have an advisory service available to the farming community and to conduct seminars and workships on specific topics.

Agriculture Energy Audit

An energy audit program is to be developed over the next six months to meet the needs of Island farmers. This program is designed along the lines of audit services presently available to industrial and commerical ventures on the Island.

6. WASTE OIL REUSE OR RECLAMATION

Funds were approved in the past year to assist an Island firm in defraying the cost of having its waste oil burner analyzed by the Underwriters Laboratory of Canada. U.L.C. approval is a requirement prior to the manufacture and sale of these burners to the general public.

OTHER ENERGY-RELATED ACTIVITIES

INSTITUTE OF MAN & RESOURCES

1. WIND

The Atlantic Wind Test Site

During the first year of operation of the wind energy programs, it became evident that many demonstrations and applications of Wind Energy Conversion Systems (WECS) were being performed with little or no attention to monitoring and evaluation of system performance. Machines were often erected and operated, and then failed for one reason or another with little or no historical record. Often experiments were not adequately planned, coordinated and funded to obtain a good scientific record of tests and experiments performed. It could be seen in this climate that the industry, consumers and/or government (funding agencies) would suffer from poor information. In recognition of this major barrier to the development of a Canadian wind energy industry and market, the Institute of Man and Resources, in July 1978, presented a proposal to the Department of Energy, Mines and Resources for the development of the Atlantic Wind Test Site.

In July 1978 the proposal to develop the site was accepted and was introduced by Amendment into the Canada/P.E.I. Agreement. The Government of Canada provided an addition to the Agreement of $380,000. and the Government of Prince Edward Island $92,000. towards the establishment of the site and its laboratory facilities.

A 185-acre site at North Cape was selected and leased from the Government of Prince Edward Island by the Institute of Man and Resources for operation of the project. A laboratory building has been constructed on the site and a data acquisition and instrumentation system installed to allow efficient monitoring and performance testing of up to 16 WECS. Several proposals for work at the site have been written to a

variety of potential clients. To date one proposal, a wind speed/wind power correlation study, has been accepted and a contract signed to perform the specified work.

2. WOOD

The wood program has been the largest of the Institute's programs under the Canada/P.E.I. Energy Agreement.

Wood Harvesting

A first year review of wood energy technology indicated that the cost of wood chip fuel was a critical factor in the economic evaluation of wood energy systems. A full-scale demonstration was carried out that determined the cost of producing and delivering whole tree chip fuel to a major user.

Residential Wood-Fired Central Heating Systems

In 1979 the Institute initiated a residential wood heat project in order to encourage the substitution of a renewable wood fuel supply system for imported oil.

The project concentrated on central heating systems rather than stoves, since the former offered significant potential for improving such factors as convenience of operation, efficiency, safety and reduced stack emissions. A demonstration of seven advanced wood furnace systems together with a control group of three conventional systems was conducted. The units were tested in Island homes over the 1978-79 and 1979-80 heating systems.

Survey of Wood Fuel Use

In order to plan future wood energy projects, it is important to generate statistics on current wood fuel use. In 1980 a wood fuel survey of 1% of Island households was carried out. Another survey is being carried out for 1981.

Economic Evaluation of a Wood Fuel Industry in 1990

The economic benefits of a significant wood fuel industry were assessed in a major study completed in 1980.

This shows clearly the stimulus that occurs by replacing imported oil with an indigenous fuel.

3. SOLAR

The projects carried out over the last three years have concentrated on those solar technologies having the highest potential for cost effective implementation. The projects have demonstrated under field conditions available equipment and systems for both space and hot water heating. In the area of solar domestic hot water (DHW) systems in particular, the Institute's program has generated field performance data of significance for the solar industry, government and the private sector.

Projects:

Solar Radiation Data Base

Available solar radiation data for P.E.I. have been compiled as a design tool for the evaluation of solar projects on the Island. The data base can be easily manipulated to give incident radiation on any scope at any orientation.

Solar Assisted DHW Demonstration

This has been a major project of the solar program. Available package solar DHW systems have been acquired by IMR and installed by contractors in Island homes. Installed costs have been recorded and a simple performance monitoring system established. Although several systems have been disappointing in thermal performance and reliability, certain units continue to perform well. A significant improvement in the quality of commercial systems has been noted in the last year.

Owner Build Low Cost Solar DHW Systems

Solar DHW tests showed that only an owner built system could meet the maximum cost requirement of about $1,000. for an economically attractive unit at current subsidized energy prices. Such a prototype was developed based on the design of a unit which performed well in the DHW tests. An instruction

manual was prepared and a series of workshops held. Approximately 30 units are under construction or have been built by homeowners.

Low Cost Monitoring System

Conventional data logging systems are very expensive when compared to the cost of most alternative energy technologies. Progress towards efficient solar systems will be enhanced with good performance data from demonstrations. An electronic monitoring system was developed and is presently being used to monitor the Des Barres and the Cornwall Church projects. A more refined unit is in the final stages of development by a local manufacturer.

4. LOW HEAD HYDRAULIC

The low head hydraulic program was implemented to meet the following objectives:

1. To determine the extent of the hydraulic resource in Prince Edward Island;
2. To develop a low cost and appropriate technology for application in Prince Edward Island and similar areas;
3. To demonstrate a locally-manufactured low cost hydro-electric generation system in a suitable Prince Edward Island location.

The Institute of Man and Resources, in conjunction with a federally-funded youth program, Katimavik, restored a derelict dam and spillway on the Dunk River at Breadalbane as a demonstration site for a low head hydro-electric system. A small, 3 KW Banki type turbine, suitable for local manufacture, was designed.

The resource assessment study of low head capability concluded that there is approximately 1 MW of firm hydro capacity in P.E.I. Based on this assessment and estimated capital and maintenance costs, it is clearly not economically feasible to develop this recource as a practical source of electrical supply in P.E.I. This, however, does not rule out the feasibility of

smaller owner-built systems that involve low capital costs and the contribution of the owner's time to build, maintain and operate the system.

5. LOW ENERGY COMMUNITY

The original low energy community program envisaged the Hillsborough Development becoming an energy efficient community. An anlaysis of the marketplace and the trend toward so many single family lots indicated that the program was not feasible on such a scale at this site.

In conjunction with the Architects Association of Prince Edward Island, the Institute of Man and Resources sponsored a mini-energy efficient community demonstration. The program was designed around combining good design and careful construction techniques to provide housing that is energy efficient, attractive and relatively inexpensive to maintain. The five houses, constructed as a mini-community in Hillsborough Development, offer a variety of designs suited to different site topography. Each house has a designed heat load approximately 50% lower than that of conventional housing.

Three of the houses have been sold; monitoring will take place over the 1980-81 heating season.

6. THE ARK

The planning, development and construction of the new greenhouse at the Ark site was the major project throughout the past year. This greenhouse will test a modular, low-maintenance, solar-heated commecial greenhouse, particularly suited to the climate and latitude of Prince Edward Island.

Funding assistance for the design of the greenhouse was obtained through a contract with Agriculture Canada, and the capital costs, originally estimated at $25,000, were supplied through the Canada/P.E.I. Agreement. Just prior to the start of construction, it was decided to expand the projected size to accommodate an aquaculture hatchery, increasing cost estimated to $35,000.

Education

Although the Ark has been internationally well known since its opening, it has only been within the last few years that the research has begun to generate information. While this knowledge is passed along to researchers and other professionals through the usual channels (conferences, scientific reports and publications), it is important that the findings of the research be made available to the interested general public also. The education program uses a number of different programs to do this; publications, the visitor program, workshops and media coverage. Throughout the past year, some of these have been expanded, others re-evaluated and discontinued, and some maintained.

Greenhouse

This past year, the ongoing routine work in research and demonstration of solar greenhouse management was overshadowed by new developments in the biological control program.

The study and use of "beneficial insects" have reaffirmed the opinion that they have the potential to be extremely valuable as aphid predators in commerical greenhouses.

Horticulture

The vegetable garden was again grown to test varieties for their suitability to this climate and organic techniques; to demonstrate the techniques and to test variations in organic methods.

Further work in season extension and composting was carried out at the Ark site and a demonstration garden grown at the community garden site in Charlottetown.

Biological Control

1980 has seen a narrowing in focus of the biological control program. Until the spring of 1980, a number of different problems were being studied, but it became obvious that the project which should receive most emphasis was the work on mycorrhizal fungi. The reasons for concentrating

in this particular field are:

(a) Worldwide recoqnition of the potential of mycorrhizal fungi in the production of wood and fuel; and

(b) lack of information and techniques on the practical application of mycorrhizal fungi on agriculture.

Aquaculture

The hatchery in the Ark's commercial greenhouse has been used to hatch and rear rainbow and speckled trout and Atlantic salmon.

7. INFORMATION TRANSFER

Although not designated as a separate program element, information transfer has played an important role in the Canada/P.E.I. Agreement on Renewable Energy Development. The information transfer program contains the following elements:

(1) library services
(2) enquiry services
(3) publications
(4) public/media relations
(5) education
(6) conference participation

P.E.I. ENERSAVE

1. ENERSAVE FOR INDUSTRY AND COMMERCE

This program offers operators of industrial, commercial and institutional buildings expert advice on the implementation of energy conservation programs. The goal of the program is to stimulate a broad public awareness of the potential for energy conservation in buildings and to actually realize significant energy savings in as many buildings as possible.

The Enersave Bus, owned by the federal government and operated by the Province, is available to perform energy audits on request. By means of an on-board computer, analysis of plant energy use patterns and the potential for energy saving can be performed.

To date (February 28, 1981), nearly $11 million in energy bills have been audited with an indicated potential savings of over $2.5 million; this represents an average potential saving of 25 1/2 percent per client.

Grants

Should the client decide to follow-up on the recommendations of the energy audit, retrofit grants are available to assist them offset the costs for modifications to mechanical systems and other conservation measures. Where applicable, the audit team will recommend further anlaysis of the building be undertaken by a consulting engineer or architect. Grants for this consulting service are also available under this program.

To date (February 28, 1981), $875,013. has been paid out in Retrofit grants, and $101,999. in consultant grants.

2. P.E.I. ENERPOOL

The primary objective in implementing the Van Pool Program was its potential to conserve energy resources by reducing the number of vehicles commuting to and from work and thereby reducing the consumption of gasoline, oil and

other petroleum derivatives. In developing guidelines, first consideration was given to the primary objective which will also be effective in reducing pollution to the environment and traffic congestion on major thoroughfares and main arterials.

Secondly, consideration was given to the alternate this provided employees to commute to and from their work location. In this area the primary objective was to design a procedure that would be consistent with the objectives of the program and yet be fair and impartial to the participants.

In January, 1979, three 15 passenger vans were leased for the pilot phase of this program, with a fourth van added to the fleet the following year. Each full van has the potential of reducing gasoline consumption by 47,000 litres per year.

Present passenger rates are $35.00 per month plus 1¢ per km per day. Rates are increased from time to time in accordance with increases in gasoline costs.

3. INFRARED THERMOGRAPHY PROGRAM

At the request of homeowners, Enersave conducted scans on the inside of their homes to identify areas of heat loss and recommended the appropriate corrective measures.

A highly sensitive infrared thermography camera, similar to the mobile unit used by Enersave for Industry and Commerce, can scan a house and convert the scene into a T.V.-like "heat picture". Temperature differences are indicated by the level of brightness in the picture along a gray scale, (black = cold; white = hot). For the homeowner, especially in situations where insulation has been blown inside finished walls or inaccessible attic spaces, this means that insulation insufficiencies or failures which lead to heat leaks can be easily located.

A picture and a written report identifying any problem areas are left with the homeowner, providing him with quick reference material should he decide to take corrective action.

There is a charge of $25.00 per client for this service.

Over 100 scans have been conducted during the 1980-81 heating season.

4. ENERSAVE INFORMATION PROGRAMS

(a) Enersave Update: This publication primarily describes energy audits conducted by Enersave for Industry and Commerce but also contains information relative to other Enersave programs.

(b) Display Program: In response to public request, displays on energy conservation are presented at community events throughout the Island.

(c) Resource Library: A wide variety of publications is made available to the general public.

(d) Public Information Service: Responding to telephone and written enquiries on the province's conservation programs and grant assistance comprises a large part of the ongoing daily work of Enersave staff.

(e) Home Builders Resource Book: - "Ideas to Build on". A comprehensive resource book based on the experience with the Enersave Home Builders Program. This book has been made available to the general public at various outlets including Regional Services Centres, Island Information Services and the Enersave office.

(f) Publicity and Promotion: Enersave utilizes all facets of the media to actively promote energy conservation opportunities and programs.

OIL AND GAS

Hudson's Bay Oil and Gas, as operator for a group of companies, drilled two exploratory test holes in the Gulf of St. Lawrence.

The H. B. et al East Point E-47 was drilled approximately 30 km. northeast of East Point and the purpose of the well was to investigate the extent of an earlier uneconomic discovery that had been made 6 years previous. Drilling commenced in early June and terminated in late July, with little evidence of hydrocarbons. Well site analysis revealed that all of the potential sands were wet and/or tight. The well was then plugged and abandoned. The rig was moved off location on July 27, 1980, and towed to the Beaton Point F-70 well site.

The Beaton Point F-70 well was drilled to investigate the flank of a salt dome, that was hoped might yeild a suitable trap for hydrocarbon accumulation. Drilling commenced at the beginning of August and was terminated late in the same month. Well site analysis revealed respectable porosity (13-15%) at one level but this section was wet; all other sections proved to be both wet and tight. The well was plugged and abandoned and the rig was moved off location on August 3, 1980.

The Hudson's Bay Group has been granted a further one-year extension to their permits consisting of almost two million acres. This will allow the company time to complete assessment of the drilling results and do additional seismic work in Northumberland Strait with a view to further drilling in 1982.

Chevron Standard and Irving Oil Company were granted permits during 1980 to explore for oil and gas. The companies completed an approximate 5M contract extensive off-shore seismic program and approximately one-third of their planned seismic on land. The remaining seismic work will be completed this spring with a view to identifying drillable locations for 1982.

Both exploration programs were conducted under the supervision of the Energy Branch. To the extent possible,

Island workers and services were used for both drilling and seismic operations.

The cost of the drilling is estimated at $14 million with the seismic work to cost about $5 million when completed.

A total of 42 Islanders were employed by H.B.O.G. and the drilling contractor during the drilling of the two offshore wells. In addition, another 12 workers were employed aboard the supply vessels and in loading operations at the Georgetown supply base.

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AN ENERGY STRATEGY FOR PRINCE EDWARD ISLAND

P.E.I.Energy Corporation
January, 1980

Kerr Energy - Prince Edward Island

AN ENERGY STRATEGY FOR PRINCE EDWARD ISLAND

P.E.I.Energy Corporation
January, 1980

PREFACE

National and international energy policies may drastically alter the energy situation in P.E.I. Furthermore, changes in knowledge and information will have a bearing on our strategic choices.

Thus, while a strategy is essential if we are to take any action, it must be recognized as a dynamic strategy, that is one which responds to these forces of change.

The reader must accept this strategy with these factors in mind. It is, in effect, a stage in an evolutionary progression.

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APPENDIX 1

BACKGROUND

The Energy Market

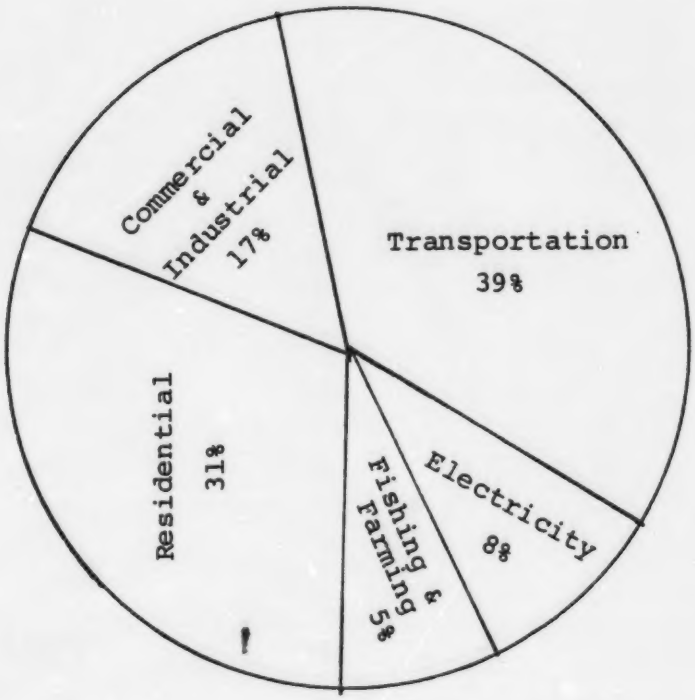
Energy from petroleum is, metaphorically, the lifeblood of our present industrial society. Until the 1973-74 Arab/Israeli war and subsequent oil embargo, there was relatively little public interest in, or concern for, this fundamental commodity. The embargo, subsequent shortages, and the sharp price increases, brought home dramatically to people around the world the importance of oil to the economies of all nations, rich and poor alike. To help explain the resulting energy predicament and to establish a basis for public response it is helpful to examine energy as a commodity -- that is to view it in terms of a market with a certain demand and a certain supply, linked by a complex price determining mechanism. The market like most real ones, is imperfect. It is characterized by uncertainty, poor information, lack of competition and so on. Whether imperfect or not it is certainly real and we will spend up to fifty years adjusting to the dictates of this commodity market.

Demand

On the demand side of the market there are two important considerations -- the growth in demand over time and the composition of demand by users and uses. Composition of demand can be characterized in various ways, each of which has its own particular advantage in helping to understand demand.

Here, we present in Figure 1 the composition of demand by end-use sector. This method of presenting demand data illustrates the relative importance of the sectors and provides one way of estimating the potential for saving. Electricity was separated from the other two sectors to show that in spite of its pervasive use it represents a relatively small, 8%, of total end-use consumption. The other data show that transportation, both passenger and freight, account for the largest part of consumption in P.E.I., 39%, while residential space heating accounts for 31%, and commercial and industrial requirements for space heating and industrial processes accounts for 17%.

FIGURE 1



SECTORAL ENERGY CONSUMPTION
PRINCE EDWARD ISLAND

The second important consideration relating to demand is the growth over time. Trends can be related to particular sectors and to overall consumption. Both are important; for example individual sector information can be used to measure the effectiveness of a publicly funded conservation program: The overall consumption trend will be important in estimating future total energy needs. For the purposes of this paper total energy growth in refined petroleum products consumption and in the electrical sector are provided to give a basis for goals to be discussed later. Trends in gasoline consumption and some efforts at controlling demand are also discussed briefly.

Refined petroleum product (gasoline, diesel fuel, light and heavy heating oil, etc.) consumption appears to have grown at a rate of less than 1% between 1972 and 1978 in P.E.I. Although growth in particular refined products has been much higher, changes in others are believed to have compensated.

Demand for gasoline is determined chiefly by average fuel efficiency of cars in use and miles driven. Gasoline statistics show a growth of about 4% per year between 1972 and 1978. The reasons for the growth have not been analysed. There is a recent trend toward the purchase of lighter cars, no doubt related partly to the fact that the manufacturers are building lighter cars comparable in size to earlier models. Comparing all cars purchased prior to 1979 with new cars purchased in the 1979 and 1980 model years, the median weight has fallen from about 3,400 lb to 3,150 lb to 2,750 lb respectively. This reduction of about 650 lb, or 19%, in the median car weight represents a change from the older American compact cars with eight cylinder engines to the redesigned compacts with 4 cylinder engines. The probable impact of the change on fuel consumption has not been determined accurately. A rough estimate is that it will be reduced by about 30%, but this must be confirmed.

Available data do not provide a complete understanding of the causes for changes in consumption of particular refined products, and there is also uncertainty in the total consumption data.

More analysis is required to help guide future programs and projects.

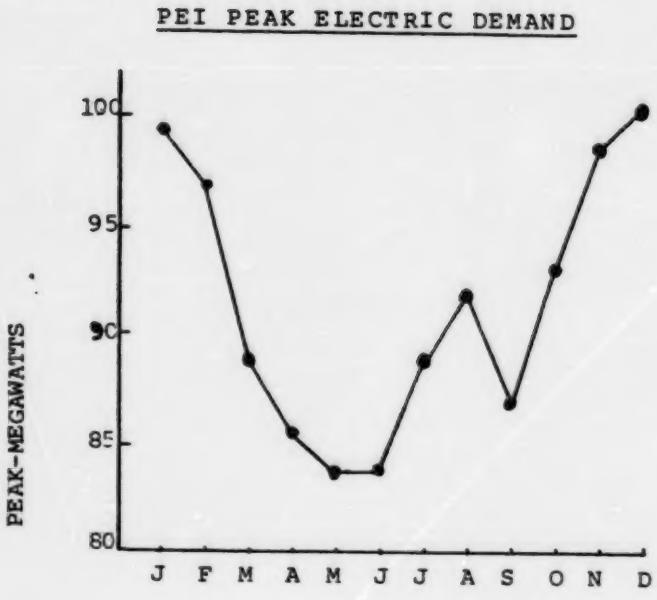
In order to understand the implications of growth in the electrical sector we must first make a technical distinction between the demand for power and the demand for energy.

An analogy to a car may help to explain the concepts of power and energy. A car travelling at a steady speed requires a certain amount of power to overcome friction from the road and the air rushing over it. The energy the car uses depends upon how long the power is provided. In other words the gasoline used, which represents the energy, depends upon how far the car is driven, while in the electrical system the comparable measure is determined by how long the power used. Thus power represents the rate at which energy is being used (gallons per minute or kilowatts for example) and energy represents how much is used (such as gallons or kilowatt-hours).

For the electrical system, power is the total rate at which electrical energy must be supplied to satisfy the demands of all the electrical equipment turned on at a particular instant. The variation in the maximum power, also called peak load or demand, for each month in 1979 is shown in Figure 2. In P.E.I. the peak on any given day usually occurs about suppertime when many stoves and other appliances are in use. In 1979 the peak demand was only 1% higher than in 1978. It is believed that this is because Islanders responded to Maritime Electric's ad-campaign requesting reduced use of electricity in the "rush hours" from 4 to 7 p.m. In a "normal" year growth in peak load of six or seven percent would have occurred.

The peak is important because it determines the maximum amount of power the system must be capable of delivering. P.E.I.'s interconnection agreement with New Brunswick requires that P.E.I. have enough capacity to supply its own peak, plus 15% to cover emergencies. If the system cannot meet this criterion, then peak capacity must be purchased from the New Brunswick system

FIGURE 2


PEI PEAK ELECTRIC DEMAND
PEAK-MEGAWATTS
100
95
90
85
80
J F M A M J J A S O N D

at a cost of about $15 per month for every kilowatt (NOT kilo watt-hour) of extra capacity used for a period of one year. This is standard in interconnection agreements and recognizes the need to pay for the fixed capital costs of the capacity required as well as the operating costs.

In a "normal" year then, if P.E.I. did not have the ability to meet its obligations under the terms of the interconnection agreement, and peak demand grew at 6% instead of 1%, it would mean an additional payment to New Brunswick Light and Power of about $75,000 per month for 12 months, or $900,000, to supply a short-term peak that might occur only once. This represents the annual payment needed to "purchase" the extra 5 megawatts that the peak load would require.

While the cost is high, P.E.I. is thus able to meet its peak without constructing new electrical capacity immediately.

The demand for energy as distinct from the demand for power is represented by the total number of kilowatt-hours supplied by the system. As in the analogy to the car, the fuel used by the system is related fairly directly to the amount of energy supplied. Thus, since the cable to New Brunswick was put into operation, fuel consumption at the Maritime Electric station in P.E.I. has fallen drastically. That oil is now being burned in New Brunswick as most of the energy being purchased is considered to be generated by oil-fired units in that province which are more efficient because they are larger.

Year-to-year growth in peak load (power) varied from a low of 1% between 1978 and 1979 to a high of 7.6% between 1974 and 1975, and averaged 5% over the period from 1974 to 1979. Year-to-year growth in energy consumption varied from a low of 1.6% between 1976 and 1977 to a high of 9.1% between 1974 and 1975 and averaged 6% over the period from 1974 to 1979.

Supply

There are three important, inter-related aspects on the supply side of the energy market: These are source, security and price.

Source has technical, geographic and political implications. Technically, Prince Edward Island is dependent on oil for almost all of its energy demands. Wood supplies less than 15% of domestic heating and cooking needs or about 5% of total energy use. About 60% of the electricity used is now purchased from New Brunswick and about 95% of this is priced on the basis of oil-fired generation.

Geographically, P.E.I. and other Atlantic provinces have always been entirely dependent on foreign sources of oil. However, Canada only became a net importer shortly after the Arab oil embargo of 1973-74. Until then exports of Canadian oil to the United States more than balanced imports in eastern Canada. The net level of imports has grown rapidly since then and is now about 365,000 barrels per day, almost 20 percent of Canada's total petroleum consumption.

Aside from the political implications, it is not meaningful to talk about the source of supply since these change rapidly under the purchase and sale policies of the refiners and the OPEC countries. Iran which provided 20% of the oil used in the Atlantic provinces during the last quarter of 1979, now supplies none.

New developments in the oil sands and heavy oils will no doubt supply some of our future oil requirements. The Mackenzie-Delta-Beaufort Sea, the Sverdrup Basin in the four northern Arctic islands and the Labrador Shelf are all being explored. These developments may be providing up to one million barrels per day by 1990 according to projections made by the Department of Energy, Mines and Resources. Even though a promising oil find has been made on the continental shelf east of Newfoundland recently, this oil, like other frontier discoveries, will not be available for at least five years and its cost will be high.

There has been some exploratory drilling for oil and gas in P.E.I. but no commercial quantities have been found so far. Additional drilling for gas by Hudson Bay Oil and Gas on a lease off East Point is proposed this year. A recent proposal has been received from Chevron to lease the rest of the lands under P.E.I.'s control for $200,000 per year and further exploration would be required under the terms of the contract.

It is worth pointing out here as we consider domestic supply that oil off Newfoundland and potential finds in P.E.I. and elsewhere are non-renewable, as are most of the world's current energy sources. Our legacy to future generations will be a poor one indeed if we lose sight of this simple fact.

The second aspect of supply is security. Current unrest in the Middle East, which provides 51.5% of Canadian imports, demonstrates how uncertain the supply from this region is and simply adds to the insecurity caused by the collapse of the Iranian government over a year ago and the subsequent disruptions in oil supply.

In case of a sudden cut-off of oil, Canada and 19 other nations have agreed on procedures to share the resulting shortage. In Canada, an Emergency Supplies Allocation Board has been formed to distribute products at the wholesale level. P.E.I.'s role in this procedure and needed action is discussed in more detail later. Our concern must be to see that we are ready to implement emergency procedures for which we are responsible.

Last, but not least, in the supply aspect of the market is price. The price of imported oil has increased from $2.60 per barrel in 1970 to $14.10 per barrel in January 1977. Disagreement over price among OPEC nations has now led to a range of prices being set. The lowest, set by Saudi Arabia, is now over $30 per barrel. Venezuelan oil, another major Canadian supplier, is $33 per barrel as of January 1980. The Canadian price is now fixed at $14.75 per barrel.

Canada, because its oil resources make it one of the most well-endowed, industrialized nations, has been able to cushion the impact of the sudden price rises which most other nations were forced to pass on to their citizens directly. The cost of this subsidy is becoming unbearable and further price rises are essentially a certainty. Oil imports in P.E.I. alone were subsidized by over $30 million in 1979, equivalent to more than $250 for each and every Islander.

These imports have been financed by borrowing. In 1978, the Canadian oil trade deficit was nearly $1.5 billion. The deficit in 1980 could be as high as $3 billion. Canada is thus incurring long-term debts which, at the very least, impose increases in future interest payments and all that those increases in interest and debt will entail with respect to inflation, balance-of-payments, the value of the Canadian dollar, etc.

Since P.E.I. has no supply of conventional energy, Islanders have begun looking at our own renewable sources: wood, wind, solar and hydro. Evidence of interest has come in the form of sales of wood stoves, interest in the production of wood for fuel and inquiries on wind, solar and hydro power. Being largely small private sector activities on which there are no firm data, these trends cannot be quantified readily. In spite of the public interest the technologies needed to make these renewable sources widely acceptable are not presently available. Under the terms of a cost sharing agreement between Canada and P.E.I. work has been underway to define the technical and economic feasibility of these sources for P.E.I. There is widespread agreement that wood can make a significant contribution to supply if it is developed carefully.

To help overcome the problems created by dependency on foreign oil, recent Federal government initiatives have suggested that Canada should aim for petroleum self-sufficiency by 1990. Conditions are such that we expect there will continue to be a goal of self-sufficiency for Canada. It is important to note that all the potential sources for the energy needed to

achieve self-sufficiency are costly and difficult to develop.

PROBLEM

This background serves to highlight some of the main characteristics of the energy problem facing Islanders. The structure of our economic system, of industrial, agricultural, fisheries production, tourism and the consumer market, is based on cheap oil: Over the past fifty years and more, we have made investments in machinery and equipment that depend on cheap oil to provide heat, electricity and motive power.

The supply of that oil has increased in price more than ten times in just ten years; Canada has gone from a net exporter to a state in which we depend on imports for 20% of our oil supply; over one half of the imports come from politically unstable areas. While exploration is underway to find new sources none of these will be easy or cheap to develop.

Perhaps most importantly, at least in the long term, must be the fact that all oil is non-renewable. Barry Commoner has noted:[1] "What is also true and highly relevant as well is that with each barrel of oil taken out of the ground the next barrel becomes more expensive. Inevitably, as a non-renewable energy source is depleted, the cost of producing it -- and therefore its price -- rises progressively faster. It is this economic feature of nonrenewable resources like oil which causes a crescendo of trouble, mounting to a crisis."

The proportion of family income spent on direct energy purchases in P.E.I. has remained at about 12% since 1970 because family income has risen about as rapidly as energy prices. However, this has only been possible because imported oil has been heavily subsidized. In future, rising energy prices will inevitably take a larger share of income if we are to avoid imposing the cost of continuing subsidies on future generations.

1. Barry Commoner, New Yorker Magazine, April 23, 1979.

Furthermore, the insecurity of present sources will continue to raise anxieties beyond those created by price alone. The high cost, long development time and non-renewable nature of energy sources currently being developed hold no promise of changes in this situation.

OBJECTIVES

The general objective of an energy policy must be to reduce our dependence on imported oil. Since it has taken over fifty years to put the present oil fueled system in place it is reasonable to assume that the problem can only be solved without serious disruption to our society, economy and environment, on a similar time scale. However, because of the real possibility that disruptions outside our control may occur, careful plans for dealing with emergencies must be prepared.

Two responses are available to Islanders, both of which we have just begun to explore. The first is to reduce our demand for energy, the second is to develop local energy sources, namely renewable sources such as wood, wind and solar and hydro.

Reducing demand through more efficient use of energy will reduce costs in the various economic sectors and thus help them to remain competitive. The impacts of increasing energy costs on Islanders will also be moderated. Jobs will be provided in capital projects which aim to reduce energy consumption. And conservation will also contribute to P.E.I.'s share of the expected national goal of self-sufficiency.

Renewable energy systems can help to stabilize long-term energy costs by providing alternate local resources which reduce the flow of money from P.E.I. Continuing, stable employment opportunities will also be provided. And renewables will also contribute to national self-sufficiency.

The use of wood as an energy source will lead to improved quality in the forest resource. As an example of the potential

economic impact, about eighty percent of money spent on wood remains in P.E.I., whereas about ninety percent of money spent on oil leaves the province in the first step of the transaction. If wood is to be a major element in the long-term energy future of P.E.I. it must be developed with a sensitivity to the potential environmental impacts of increased harvesting activity and especially, the need for reforestation. Programs of the Department of Agriculture and Forestry will address these concerns.

GOALS

Measureable goals are an essential part of an energy strategy if we are to gauge progress towards the objective. Separate goals are proposed for reductions in the growth of refined petroleum products consumption and in the electrical sector because of the historic difference between them. The goals are our current best guess at the likely response, given the effect of high prices and incentives.

Taking the growth in refined petroleum products between 1972 and 1978 to be about 1%, we propose to reduce growth so that consumption will be stabilized at about four million barrels per year. It is clear that consumption will depend on economic growth, population, industrial structure and technology, and it is possible that a more refined goal will be developed as we learn more about the response of the system to proposed changes.

The petroleum products goal is based on federal statistical information on consumption in P.E.I. over the 1972 to 1978 period. Other data suggest that the growth rate may have been up to 4% per over the same period. An adjustment will be made in the suggested goal if further inquiry shows that the assumed growth is incorrect.

In the electrical sector the goal will be to reduce growth in both consumption and peak demand from 6% and 5% respectively

over the past five years to 3% by the end of the next three years. Within the electrical sector there have been years included in the average compound growth rates of 6% and 5% during which the growth was only 1.6% and 1.0% respectively. These years tend to pull the averaged figures down substantially in the short averaging periods used and the goals may turn out to be optimistic.

These short-term goals are in keeping with the long-term Canadian goal for self-sufficiency. Whether the Canadian goal is to be achieved by 1990 or later will not have any appreciable impact on the immediate short-term goals.

Accomplishing goals requires resources. These include human, financial and physical resources and, perhaps most importantly, time. The goals suggested are based on preliminary evaluation of the improvements in efficiency of energy use and the substitutions for oil-based sources which can be accomplished with the resources which we estimate can be made available. The goals will be refined as more detailed implementation plans are developed and a clearer picture of the resources and time needed and of the federal program emerge.

IMPLEMENTATION

Responsibilities for energy matters in the government sector have been spread through a number of departments, agencies, commissions and committees. In addition organizations in the private sector have been involved and will continue to have significant roles to play in P.E.I.'s energy future. In implementing its energy strategy in the short-term the government has asked the P.E.I. Energy Corporation to coordinate the efforts of existing departments and agencies, both private and public. The Corporation will thus be able to coordinate current efforts in research, development, demonstration and implementation/commercialization, and to identify the human, financial and physical resources needed at each stage.

There will be a need for continuing research and demonstration

to determine the technical and economic feasibility of proposed projects, to evaluate alternative procedures for implementing programs and to provide monitoring of large demonstration projects. The appropriate organizations for these activities will be identified.

A crucial aspect of implementation is related to financing and cost sharing of programs and projects. Energy related expenditures during the coming year are estimated at $5 million. The sources of this funding are as follows:

- Canada/P.E.I. Agreement on Conservation and Renewable Energy	$3.2 million
- P.E.I. Energy Corporation	1.2 million
- Development Plan	0.6 million
Total	$5.0 million

The Canada/P.E.I. Agreement on Conservation and Renewable Energy is the single agreement which will replace the two existing agreements on industrial energy conservation and renewable energy development. Details on the funding will be made available when estimates are tabled.

POLICY ISSUES

A number of important policy issues require detailed definition. The major issues and their present status are addressed below:

Nuclear power

The government does not support the use of nuclear power in P.E.I. and is attempting to renegotiate our arrangement with New Brunswick which called for participation in the ownership of the LePreau power plant. The reasons for this stand are both economic and environmental. Before elaborating on these reasons it is important to put the issue in perspective.

The Island's potential involvement in nuclear power would provide roughly 3% of total end use energy consumption based on the

purchase of roughly 30 megawatts of capacity and on the fact electricity consumption, which is all that the LePreau plant would provide, is only 8% of the total end use consumption in P.E.I. Even examined from the point of view of total expenditures the electrical energy from LePreau would amount to about 10% of a typical householder's total energy bill in P.E.I.

The economics of producing power from nuclear plants are uncertain and hence risky at the present time. Even though the plant is only a year or so away from the proposed commissioning date a firm price for the power and energy have not been established. The effect of public opinion, right or wrong though it may be, continues and will continue to increase the risk associated with the commissioning of nuclear power plants.

Decommissioning costs would also be the responsibility of those participating in the project and although these are purported to be insignificant in the total picture when looked at from today's perspective, they will certainly not be considered insignificant by the next generation which will have to pay them unless we make adequate provision today and throughout the life of the plant.

The possibility of breakdowns on a massive scale certainly exist, witness the Three Mile Island incident, and, even if the safety hazard is ignored, the cost of losing a unit which would be providing 40% of our electrical requirements cannot be overlooked.

Environmental problems, especially with respect to the disposal of spent fuel have not yet been solved to the satisfaction of many experts, including some working at AECL. Until a satisfactory solution is found we believe the construction of new plants should be delayed.

Capital tied up in a single large project at LePreau, in addition to being a risky investment, would not be available for the

development of other projects in P.E.I. which could provide a continuing source of jobs and which would keep dollars in our provincial economy.

While we ourselves do not wish to become directly involved we recognize the rights of others to choose for themselves. We also recognise that we cannot separate the electricity from the LePreau plant from that from other sources, which we may purchase through the power cable to New Brunswick, in any physical way. However, in our dealings we can eliminate the LePreau plant from the calculations of power and energy prices.

We acknowledge that we cannot avoid the health or safety risks in this way but it is important to note that if others had taken a position similar to ours, the LePreau plant would not have been built.

The simple fact of the plant's existence is an inadequate reason, in our view, to become involved with a risky venture having uncertain costs which would decrease our ability to establish our own facilities.

Emergency Oil Allocation Strategy

The Energy Supplies Emergency Act, 1979, empowers the Federal Government to declare a national emergency in the event of an actual or anticipated shortage of petroleum or a disturbance in the petroleum market considered to be severe enough to affect the national security, welfare, and economic stability of Canada. A seven-man Energy Supplies Allocation Board, which has been appointed, has the power to make and enforce regulations and priorities for the distribution of petroleum products at the wholesale level.

The Federal Allocation Plan is quite comprehensive and includes

(a) A Crude Oil Allocation Manual
(b) A Petroleum Products Allocation Manual
(c) A Gasoline Rationing Manual

There is also an International Energy Agreement to which Canada is a signing party and defines how shortages are shared among 19 Nations.

As far as P.E.I. is concerned, the province is responsible for:

(a) Control at the retail level

(b) Appointing a Coordinator responsible for liaison with the Emergency Supply Allocation Board and being responsible in times of emergencies for the administration of a Regional ESAB office.

A Provincial Plan will be developed that takes into account likelihood of shortages, possible duration, costs of alleviating shortages through conservation, allocation, rationing, and means developed for financing emergency storage and transportation systems and implementing plans in coordination with regional and federal governments and oil companies. Because P.E.I. normally goes though the winter freezeup without new deliveries, we may be in a favourable position to weather reasonable periods if storage tanks are kept full.

Electrical Supply Strategy

There is a very clear need to assure a supply of electrical energy in P.E.I. on a basis which takes security, price, reliability, safety, the economy and the environment into account. In developing this supply we must also consider the possible impacts of conservation on demand for electricity.

The primary benefit of increasing the efficiency of electrical energy use will be to extend the time available for planning. For example, it is estimated that a reduction in growth rate of 3% would extend the date on which additional capacity would have to be purchased, either from New Brunswick or for installation in P.E.I., from about mid-1981 to the end of 1982. More detailed analysis will be done to determine the feasilibity of accomplishing this.

On the supply side several aspects must be considered.

First, with respect to obtaining a supply directly, Maritime Electric Company Limited have been asked to negotiate a firm supply of electricity from New Brunswick. This supply is expected to be based on a 20 MW portion of the 200 MW coal-fired Dalhousie unit. The cost of electricity from the LePreau nuclear plant would not be blended into the price negotiated. This firm power would be lower in cost than that available on the interchange agreement yet P.E.I. would still have access to the same amount of economy energy currently being brought over the cable.

The second aspect is the Maritime Energy Corporation. There are potential benefits to P.E.I. in being a part of this proposal. However, much more complete definition of the details is needed before a definite decision to participate can be taken. Progress is being made in discussions and these are expected to continue.

A third aspect, related to the Maritime Energy Corporation, is a maritime grid system. There may be benefits in creating a grid even if the MEC concept does not go ahead. It may provide access to external transmission ties which would open the door to the possibility of bringing electricity from Quebec and Newfoundland hydro power into P.E.I.

Maritime Electric Company Limited

An issue which has been raised publicly in recent times is whether P.E.I. should take over the assets of MECL and operate the plant as a government owned facility. This is not a new issue. A study was done to determine the desirability of this action in the mid-1970's. The recommendation of that examination was in effect, to leave the situation as-is.

No new information has been reported that would, in our view, lead to a change in that recommendation. Consequently, there are no plans to take over MECL being considered at the present time.

Energy Pricing Strategy

The Government of P.E.I. supports the concept of allowing oil prices to rise gradually to a level of 15% below the Chicago price. In the absence of a gradual oil price increase, there will be little or no added incentive for Canadians to reduce their energy demand or to substitute for oil. A continuation of subsidized oil prices will severely hinder the introduction of renewable energy alternatives which will reduce P.E.I.'s dependency on a depleting resource and the "escape" of P.E.I. dollars, while creating jobs.

However, P.E.I. must put one important condition on its support for gradual oil price increases. Because of our present complete dependence upon oil to generate electricity, special financial measures must be taken to ensure that no Islander, or Island business or industry suffers undue hardship in relation to the rest of the region because of increasing costs of electricity.

A blanket subsidy on electricity rates to Island consumers will not serve the principle of energy conservation nor assist in the introduction of alternatives. Therefore, if special assistance becomes available because of our extreme dependence on oil for electricity generation, P.E.I. will use such funds; (a) to assist those who may be harmed seriously, for example those on fixed incomes or established industries in especially vulnerable situations, and, (b) to minimize total energy costs through conservation or substitution projects with benefits equal or greater than those by direct subsidy.

Natural Gas Pipeline

If a natural gas transmission line is built to bring natural gas to the Maritimes, as seems likely, P.E.I. will benefit only inasmuch as a supply of liquid propane will probably be available as part of the project. Until detailed information on such a scheme has been provided, the value of the proposal to P.E.I. cannot be evaluated adequately.

Possible drawbacks to the scheme include:

- The employment provided during construction would be a short-term transient nature.

- Energy expenditures would not be retained in the region to the same extent as those for wood or conservation projects.
- The costs of furnace and stove conversion would not be insignificant.
- It may delay the development of wood as an energy resource.
- There are potentially serious environmental hazards in shipping liquified propane to the proposed ports.

Potential benefits are related to the displacement of imported oil with a Canadian resource and it would help to develop offshore gas fields in Nova Scotia.

P.E.I.'s position is that if such a project is put in place fair economic treatment must be accorded the alternatives, namely, conservation and renewable energy, in the form of equivalent subsidies or grants.

Life-cycle Project Costing

In the past government projects have generally been compared on the basis of their initial capital costs, without accounting for operating cost differences. In future, in evaluating projects in the government sector, government will use life cycle costing methods which account for operating costs of projects as well as initial capital costs. Criteria for making the comparisons and procedures for assuring compliance will be developed. This will encourage the private sector to develop the necessary procedures when supplying products and services to government. We expect that these procedures would then tend to be used in private sector purchases also.

Assistance for Conservation and Renewable Projects

The Enersave program has found that the response of many organizations to the recommendations of the energy audits has been slow, although recent evidence suggests it may be accelerating. This slowness is in spite of very rapid returns on investments, often less than one year. There have been proposals to compensate for this by, in effect, doing the job for the organization. However, it is our belief that assistance

must be limited to that needed to bring the payback on such investments to reasonable periods. For example in the first phases of the program a three year payback on projects in the private business sector might be considered and five years in the institutional and residential sectors. Later on, as the risks become better defined, the payback periods might be extended. The government would thus be able to share in the higher risk associated with the introduction of conservation and renewable energy projects, yet be able, using preannounced criteria, to reduce the assistance as the potential savings become more certain.

The province's financial participation would be limited to a pay-back period to be determined based on changes in returns from ordinary taxes. Participation on a similar basis would be sought from the Federal government.

The evaluation of a project would thus account for the interests of the private sector and both levels of government. Procedures for determining the interests of each party, taking into account the need for simplicity, fairness, ease of administration, etc., will be developed.

This approach will avoid making the programs "give-aways" and make the best use of the limited funds available to all parties. At the same time, it is hoped that the guidelines will provide the private sector, both business and the consumer, with a clear indication of the government's desire to help and will avoid the delay in private decisions in the hope of greater subsidies or better grants in future.

PROGRAMS AND PROJECTS

In the past several actions have been taken to reduce demand. These have included:

- The CMHC administered Home Insulation Program. Acceptance of this program has reached nearly 80% of eligible residences in P.E.I.
- Reductions in lighting, heating and ventilation needs in government administrative buildings and schools which have reduced the annual energy bill by about $300,000 or 10%.
- Energy conservation projects and research and development work done under the terms of two energy related cost sharing agreements between Canada and P.E.I.

In the following sections, programs and projects aimed at following up on these initiatives are described.

Programs

Two major programs which arose from the agreements signed with the Federal government end officially on March 31, 1980. The work being done under these programs is now needed even more than at the time it was begun and negotiations are underway to extend both programs under a single agreement with the projects in each being clearly identified and coordination being provided by a single management committee.

Interim funding for the two programs has been approved and will allow the staffs on both programs to carry on their work while the new agreement is being developed.

Outlines of the two proposals which will be combined to form the new agreement are given in Appendix 1.

The Energy Corporation has been designated as the Agency responsible for negotiating a new agreement with the Federal government. This will help to eliminate areas of duplication which exist in the current Agreements.

Projects

A number of projects have been identified to begin the implementation of the province's energy strategy. These fall into two categories:

One in which immediate decisions can be made because sufficient information is available, and another in which more planning is needed before they can be defined.

Summaries have been prepared for projects in the first category and these follow this brief introduction. The first category projects are:

- Energy from refuse
- Energy from wood - cogeneration demonstration
- Auto fuel economy program
- Conversion of public buildings to wood burning
- Electrical load management
- Residential furnace demonstration
- Ethanol from potato culls
- Wood pellet demonstration
- Car pooling and trip combining
- House energy rating
- Residential retrofit

Second category projects include:

- Wind demonstration project
- Electricity from wood - major installations
- District heating follow-up
- Coordination - wood fuel supply
- Energy management plan for public buildings
- Greenhouses
- Fiat's total energy module (TOTEM)
- Domestic hot water efficiency improvement and conversion
- Farm energy service
- Waste oil reuse or reclamation
- School bus routing study
- Public attitude projects

In viewing the activities identified in this section the underlying objective of reducing P.E.I.'s almost exclusive dependence on oil for energy must be kept in mind to provide coherence for the strategy. Short-term activities in energy strategies, such as those described here, often appear to lack coherence. This is because energy is used in so many different ways that any attempt to control its use necessarily requires a myriad of separate and often multiple actions for each kind of consumption.

The actions described here and others being developed, are believed to represent achievable public and private levels of

effort which are expected to reduce oil-based dependence on energy to the stated goals. To succeed, continuing coordination will be provided to implement programs, monitor programs, adjust plans and to develop new programs and projects.

Descriptions of projects begin on the next page.

Energy From Refuse

Recovering the calorific content of municipal solid waste as useful energy has been successfully demonstrated in many European installations. Some 100 tons of municipal refuse are buried daily at the Charlottetown Area Regional Landfill site. The proposed project is to construct a waste burning facility adjacent to Maritime Electric Thermal Generation Plant, and to feed the steam produced into the steam header at the Thermal Generation Plant. All land use and environmental requirements will be taken into consideration in the design of the plant.

The plant will have a designed capacity of 100 tons a day and at the current garbage generation rates there is adequate garbage to operate the plant 24 hours a day, 5 days a week. Tricil Limited of Toronto, a firm with considerable experience in the design and operation of waste burning facilities, have been invited to prepare a proposal to develop a full service contract for an energy from municipal waste plant to serve Charlottetown and environs.

The Federal Government has expressed interest in constructing a Demonstration Plant of this size in Canada and have advanced a $1 million grant towards the capital cost. Revenues from the sale of steam, as well as a tipping fee for municipal refuse will offset the capital retirement and operating cost of the facility.

The construction schedule calls for 18 months to complete the project so the facility should be in operation by the fall of 1981. The plant will be owned by the P.E.I. Energy Corporation.

Energy From Wood

In the recognition of wood fuel having a potential to be used in displacing imported high price petroleum, it is proposed to construct a 1 MW wood fueled cogeneration unit in Prince County.

The demonstration project would help to confirm the technical and economic feasibility of cogeneration using wood to fuel gasifier/engine/generator units.

Proposals were received from a number of equipment suppliers and after a thorough review the proposal of Imbert Inc., West Germany, was recommended for approval by government. The Imbert proposal included an offer from the Federal Republic of Germany to provide a research grant in the amount of 50% of the cost of the equipment supplied by Imbert. The proposed funding for the project is as follows:

a) Federal Republic of Germany	$500,000
b) Development Plan	750,000
c) Federal Research Grant	950,000
	$2,200,000

The project would consist of a 1 MW installation complete with wood gasifier, dual fueled engines driving electrical generators, and utilizing waste heat for building heating purposes. The project will be the responsibility of the P.E.I. Energy Corporation and it is proposed to enter into an operating and maintenance agreement with a qualified contractor.

The Federal government through external affairs are negotiating the funding for this project under the terms of a Canada-FRG Research Agreement. The guarantee performance test on the equipment is scheduled for April 8, after which an equipment supply contract will be negotiated. Construction will take approximately 18 months so the unit should be in operation by the fall of 1981.

Auto Fuel Economy Project

To show that considerable savings can be obtained in gasoline consumption by having a properly adjusted auto carburetor, a one-week demonstration project will be conducted on P.E.I. this summer. If the results of this test are consistent with those obtained in other provinces, they will indicate that

about 60% of cars are maltuned and that, on the average, car gasoline consumption can be reduced by 10% after proper adjustment.

It is proposed to utilize the parking lot at Holland College Royalty Centre as the test site. The project will be well advertised through the media and the facilities provided will be adequage to process a minimum of 250 cars during the week. The estimated cost of the project is $9,000 and will be funded through the new Canada/P.E.I. Energy Agreement and be Coordinated by Enersave.

Following the demonstration project, a seminar will be held at Holland College with all mechanics, currently licenced to inspect motor vehicles, being invited to attend. This seminar will help in preparing a recommendation to government with regards to the best method of providing the inspection service across the Island on a continuing basis.

Conversion of Government Buildings to Wood Burning

A study completed for the Institute of Man and Resources noted that there are approximately 30 government guildings where wood-fired units 60 H.P. or larger could be installed. The provincial government is committed to implementing a program to convert oil-fired systems to wood heat. The Energy Corporation in cooperation with the Department of Public Works, is currently completing a study to determine the conversion potential of heating plants 50 H.P. and larger located in government buildings.

During the current year the conversion plans will be finalized. Assuming that the Development Plan managers agree on expenditures of Plan funding, as allocated in the 1980-81 estimates, then conversion of three buildings is scheduled for 1980. As part of the long term program a variety of wood burning units using different types of fuel, e.g. chips, pellets, etc., will be installed so the performance of each can be evaluated. Concurrent with the conversion program, implementation of the Forest Redevelopment Program will ensure an adequate supply of wood to meet the

increased demands of the public and commercial operations.

Electrical Load Management

For Prince Edward Island the preferred energy options appear to be continued purchase of power from New Brunswick; together with maximum economic use of wood and biomass materials. The province would like to utilize wood, wastes and wind to generate electricity and develop these options as rapidly as can be done economically. However, for the foreseeable future the only power option which is cheap and dependable is to continue to buy power from New Brunswick.

In accordance with the Interconnection Agreement between Maritime Electric Company and the New Brunswick Power Commission, certain charges for power supplied through the cable are based on peak loading recorded in P.E.I. during the previous year. Therefore it is to the financial advantage of all Islanders to cooperate and reduce the peak electrical loading.

Electrical Load Management is a means of reducing peak loading with a minimum of inconvenience to the householder. A recent survey indicated some 30% of the hot water heaters on P.E.I. are electrically heated. Control devices which would allow the electric utility to automatically cut off these tanks, from say 4 p.m. to 7 p.m. daily or in an emergency situation, can be installed on these heaters at a relatively small cost. In accordance with the findings of IMR this action could reduce the peak electrical load by up to 10 MW. Another means of electrical load management in the home would be to cut off the use of clothes dryers during the daily peak period. The same device that controls the hot water heater could be utilized to shut off the dryer circuit. Other possible measures relate to a varying charge for electrical consumption above a certain level during the peak period. This latter alternative has distinct disadvantages particularly as they relate to cost of installation and administration.

A demonstration program on electric water heaters will be carried out this summer. The program will consist of an evaluation of power consumption before and after load management is implemented in a residential subdivision where there is a high proportion of electric water heaters.

Residential Wood Furnace Demonstration

During the past two years, the Institute of Man and Resources has been conducting a demonstration and testing program on a variety of wood burning furnaces using different types of fuel. An evaluation report on the performance of these furnaces will be available during the early summer.

The top three furnaces identified by the IMR study will be selected for a larger residential heating conversion demonstration program involving approximately 100 homes.

By a media advertisement, householders will be invited to participate in the project and the terms of the demonstration project will be clearly outlined to the selected householders. It is proposed that loans will be made available to the householder to cover the cost of the installation and payback of the loan will be scheduled in accordance with the satisfactory performance of the system.

The services of the Institute of Man and Resources would be utilized in developing and monitoring the program. Another result of the program would be to train local tradesmen in the installation and maintenance of the new equipment. The program would be funded through the new Canada/P.E.I. Energy Agreement.

Ethanol From Potato Culls

Ethanol production, while contributing to the solution of the energy problem, is far from being a product that can solve our energy problems. Recent publicity has given some people inflated hopes regarding this energy source.

The Corporation is developing a plan for putting a demonstration plant in place. The supply of raw material (cull potatoes) at a reasonable cost is a key issue in the success of such a plant. Another key issue is if the plant uses a petroleum product as a fuel for heating and distillation then there is considerable doubt if there will be a net energy gain. The use of wood as a source of heat or using manure from an adjacent piggery to produce methane, are alternatives which must be considered to make the demonstration project practical.

Simmons and MacFarlane Ltd., Freetown, in cooperation with the Nova Scotia Technical College have been working on a pilot unit with financial assistance from the National Research Council. In response to their request for support the group was invited to submit a proposal to the Corporation in which the next development steps are defined. The position of the Corporation is that research funding should be provided by NRC but that other funding would be available for the demonstration phase of the project. The Company is currently reviewing its position with regards to this project and a proposal is expected in early February. We propose to add this project to the new Canada/P.E.I. Energy Agreement.

Wood Pellet Demonstration

While the province has placed emphasis on the use of wood as a fuel the convenience oriented consumer tends to look for processed wood which can be used in an automated wood heating system. Wood pellets can provide a home owner with a densified biomass fuel (DBF) but whether the costs of processing are offset by the economic benefits gained by utilizing the processed fuel remain to be determined.

A Wood Pellet demonstration project, say on a scale of 1 Ton/hour is required to determine:

a) Operating problems during production (die problems, quality of feedstock, etc.).
b) Drying requirement for final product.
c) Durability of product (breakup in transit or storage).

Means of establishing a small plant to produce densified biomass fuel are currently being investigated by the Corporation. If such a plant is feasible then a demonstration project would be carried out.

Car pooling - Trip combining

Transportation on P.E.I. accounts for approximately 39% of the annual energy consumption. For the rural resident daily commuting to his place of employment is an ever-increasing cost. Also in many cases the driver is the single occupant of the car. While the Enersave Bus Program has encouraged group travel, there is an opportunity for considerable reduction of gasoline consumption if residents in an area group together as a car pool. From the 1979 Origin-Destination Survey, conducted by the Department of Highways, four random stations were selected. Of 1,195 vehicles identified as commuter traffic, 721 (or 60%) had a single occupant.

The government will be promoting the Car Pool project by identifying selected areas throughout the province where off-street parking can be provided for owners joining a car pool. The assembly areas could also be the contact point for people looking for transportation to arrange a convenient travel plan with a car owner.

This basic system can be expanded into a neighbourhood cooperative program whereby individuals wishing transportation could go to a pre-designated point where car owners who are travelling could call to pick up any passengers desiring transportation.

House Energy Rating

Currently the housing market is a "buyer beware" situation with very little data being provided by the real estate agencies with regards to construction and energy efficiency.

It is proposed that an inspection service be provided whereby the various energy consuming factors in a house, e.g.heating, lighting, hot water, would be evaluated and rated against a predetermined standard. Through a media campaign the prospective home owner would be made aware of the Energy Rating and should insist on having an energy rating for the house which is up for sale. We would assume that with two similar houses of approximately the same age, the house with the higher rating would warrant a higher investment.

This program will be coordinated by the P.E.I. Housing Corporation.

Residential Retrofit Project

While many Island residents have taken advantage of grants available under the Home Insulation Program to improve home insulation and thus reduce heating costs, there are still opportunities for further improvements and efficiencies.

A cost/benefit study is required to determine those improvements which will provide the desired savings. It is proposed to select approximately 50 houses across the province, determine their present condition and upgrade to the desired standard and then evaluate the results.

The work will be carried out under the new Canada/P.E.I. Energy Agreement. The P.E.I. Energy Corporation, the P.E.I. Housing Corporation and the Institute of Man and Resources will be involved in developing the details of program development and evaluation.

APPENDIX 1

CANADA P.E.I. AGREEMENT ON INDUSTRIAL ENERGY CONSERVATION

Under Phase 1 of this agreement the Enersave office of the Department of Industry and Commerce have initiated programs which identified areas of excessive energy consumption and means of implementing conservation, particularly in the Industrial, Commercial and Institutional fields. In a number of cases the provincial program was a demonstration program, the success of which led to National programs being initiated.

Through such programs as the Energy Bus Audit, Incentives for Corrective Measures, Technical Workshops, Retrofit Grants and Program Analysis potential energy savings as high as 37% were identified. These programs have been a contributing factor in keeping the province's annual energy growth well below the National average. A demonstration program on domestic oil-fired furnace retrofit was initiated in P.E.I. Energy, Mines and Resources have indicated that in 1980 this program will be expanded to a National program.

The current agreement expires on 31 March, 1980 and negotiations are being finalized to renew the agreement for a five-year period.

The new agreement will include the extension of some of the existing programs such as the Energy Bus Audit and proposes new initiatives in the following areas:

a) Workshop & Training facilities to be established at Holland College to train energy bus personnel from all parts of Canada and abroad.
b) Provide consulting services to companies to encourage implementation of "quick-fix" measures.
c) Promote "Wide Area Monitoring" (WAMO) concept for building complexes.
d) Expansion of the Grant Programs to include not only retrofit but also substitution in industrial, commercial and institutional facilities.

CANADA-P.E.I. AGREEMENT ON CONSERVATION AND RENEWABLE ENERGY DEVELOPMENT

In 1977 the Canada-P.E.I. Agreement on Renewable Energy Development was entered into by the Governments of Canada and Prince Edward Island "to provide a framework for the support of a program to study and develop renewable energy resources within the Province of P.E.I."

The Institute of Man and Resources was named implementing agent and initiated research, demonstration and development programs in wood, wind and solar energy; low head hydraulic power; energy management; energy efficient community design and the Ark.

In the three years of the Agreement, the Institute successfully carried out programs in resources inventory, demonstration and adaptation of technology and legislative and policy research and advice. In addition, Institute programs have led to the identification of employment potential and new manufacturing opportunities in the province. The Canada-P.E.I. Agreement has, in fact, served as a model for similar Agreements in other provinces.

It has been proposed that the Canada-P.E.I. Agreement be extended into a second phase from April 1, 1980 to March 31, 1985. The second phase would include a Federal contribution of $9.6 million in cash and a Provincial contribution of $3.45 million in cash, capital and other services.

Elements of the extended, Phase Two, programs have been chosen according to a number of criteria including Island needs, community participation, economic impact, environmental impact, application potential, national interest and financing.

The phase two Agreement will continue and expand the phase one programs of wind, solar and the Ark. The wood program will be expanded to include the concept of biomass. The important role of conservation has been recognized by the division of

energy management into thermal energy management and electricity management.

Integrated systems and information, both incorporated into phase one R & D programs, will be developed into two new programs. The former program will involve applying renewable energy technologies, to evaluating their impact on, and identifying support structures for their implementation to communities as a whole. The latter program will develop and expand means to make Agreement information available to interested parties in P.E.I., Canada and other parts of the world.

Finally, because the secotr is a significant consumer of energy in P.E.I., an entirely new program, transportation, has been included in phase two. This program will review the present transportation system and define trends and transportation needs.

All phase two programs - both those that are being expanded, those that are being redefined, and those that are being introduced - will share the benefits of:

- A multidisciplinary team of skilled staff;
- sound knowledge of renewable and energy conservation technologies based on accumulated performance data;
- broad public support;
- an organizational network to bring about the implementation of renewable energy and conservation options;
- co-operative communication channels to research programs of a similar nature in Europe and North America.